Caltrans bridge inspectors use a unique method to access Sacramento County's Tower Bridge from the water. This method uses a barge anchored under the spans with lift equipment operated from the barge to gain hands-on access to the bridge. This method causes no traffic delays during the inspection.

Value and Cost of California's Bridges

Bridges are a tremendously important and enormously expensive component of California's transportation network. Replacing the 13,000 bridges on California's state highway system would be a task of unprecedented scope and would cost an estimated $57 billion.

Simply inspecting and maintaining California's bridges costs nearly half a billion dollars every year. And that does not include millions more spent to inspect the many thousands of bridges, large and small, that belong to local governments and agencies.

Size of the Challenge

State-owned bridges alone – excluding locally owned bridges — support more than 250 million square feet of deck — a surface area equal to about 4,350 football fields. To keep the state's transportation system reliable, Caltrans constantly maintains, rehabilitates, and when necessary, replaces bridges. Each bridge is uniquely designed using a variety of construction materials and subject to diverse environmental and operational conditions. Managing a network of such varied bridges is challenging, so Caltrans uses performance measures that show how well it cares for state-owned bridge assets.

Preservation funding and sound management practices are reflected in the improving bridge performance measures detailed in this report. But even in the backdrop of recent improvement, there are billions of dollars of unaddressed bridge needs. These unfunded needs include strengthening of bridges for load, upgrading of bridge barrier rails, goods movement improvements, and our ongoing commitment to seismic safety projects.

While the department has made considerable gains in our bridge program, significant work remains. Our 10-year unfunded need for bridge work is $19 billion, and 926 state bridges remain either distressed or "structurally deficient" as defined by the Federal Highway Administration. Meanwhile, more than 1,000 bridges are "backlogged," meaning they have been in need of identified repair work for more than two years.

The Meridian Bridge on Highway 20 between Colusa and Sutter counties was built in 1977 to replace an earlier bridge destroyed by fire. The swinging, turntable bridge is temporarily closed once a year for inspection. In this photo, the bridge is pivoted during an inspection, making it look as if the highway drops off.

Inspect, Inspect, Inspect

Caltrans bridge inspectors perform three types of federally required inspections on state and local bridges: routine, fracture critical, and underwater. They conduct these inspections according to national standards, and since 1927, Caltrans engineers have completed more than 742,000 inspections.

During routine inspections, licensed engineers look for signs of distress that could compromise the bridge's structural integrity. They examine all parts of the bridge, looking for any signs of deterioration and determine if cracks are superficial or more threatening. They document and monitor the bridge's condition, and if necessary, they recommend repairs. Inspectors may order additional investigation from specialized teams of engineers and technicians.

Bridge specialists conduct fracture critical inspections of steel bridges and underwater bridge piers in waterways. These inspections are designed to detect any loss of strength in steel bridge parts or potential erosion of the bridge's foundation soil that could cause the bridge to collapse. If inspectors find any issue that could compromise the bridge's structural integrity, they do whatever it takes to protect public safety. This could mean closing the bridge or posting weight limits until it's repaired.

Bridge inspection reports are prepared after each inspection and include all inspection information. These reports are maintained for each state, and local bridge in California and provide a living history of each bridge. Today, that library of information contains more than one million documents and gives engineers easy access to the entire structural history of each bridge in the state. The reports also serve as the basis for initiating timely and cost-effective repairs.

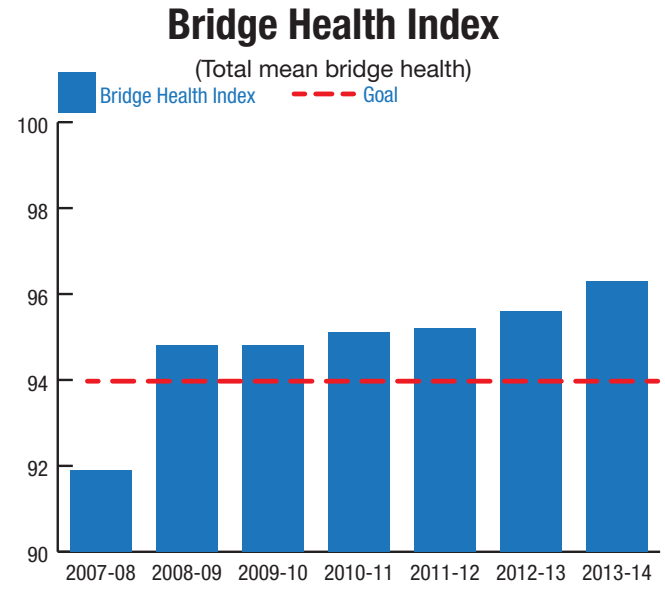
Preservation is Critical

Caltrans bridge and paint crews are in the front of the fight against deterioration and wear. These crews perform minor repairs and preserve steel coating systems on state-owned bridges. Bridge preservation work that is beyond our crews' capabilities is developed into maintenance projects that private construction companies complete. Maintenance projects focus primarily on wearable components of bridges such as overlays, steel coatings, expansion joints, and concrete sealers. Even with good preservation practices, a time comes when bridge rehabilitation or replacement is the most cost-effective action. Bridge rehabilitation or replacement typically takes four to six years to develop, and in complex situations, it can take more than 10 years.

Bridge Health Index

Bridge inspectors measure the overall condition of the state's bridge network through the Bridge Health Index — a number from 0 to 100 that measures the bridge's condition by determining its remaining asset value. A score of 100 indicates a bridge in good condition with full remaining value, and a score of 0 indicates a bridge in poor condition with no remaining value. Our goal is to maintain an average Bridge Health Index of 94.

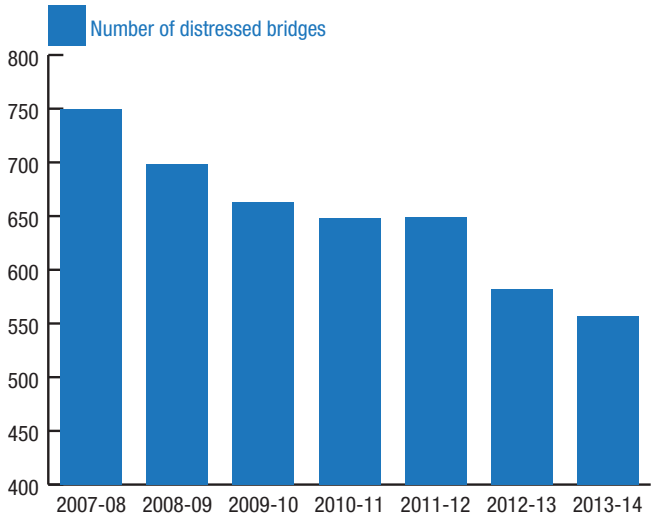
For fiscal year 2013–14, our average Bridge Health Index for the state highway bridge inventory was 96.3, a slight improvement from 95.6 for fiscal year 2012–13. The health index has shown significant improvement because of our rigorous effort to address bridge issues by providing lower-cost preservation and rehabilitation strategies that slow deterioration and delay costly replacement.



Distressed Bridges

The Bridge Health Index numbers report the condition of the bridges but do not capture other aspects of bridges that we must also manage. A bridge may be in good condition with a high Bridge Health Index but still have a seismic deficiency that we must address in the State Highway Operation and Protection Program. The Bridge Health Index also does not capture concerns such as scour, which is erosion that can undermine the bridge foundation. To capture seismic and scour needs with rehabilitation and replacement needs, we use the "Distressed Bridges" performance measure. A distressed bridge is any bridge a Caltrans inspector identifies as needing major rehabilitation, replacement, scour mitigation, or seismic retrofit.

We are reducing the number of distressed bridges through sustained bridge funding in the State Highway Operation and Protection Program. Over the past six years, the shift of funding from worst-to-first to preservation has resulted in a reduction of 25 percent from 750 to 557 bridges, and achieving our goal of less than 5 percent, or 630, of our bridge inventory being designated as distressed.



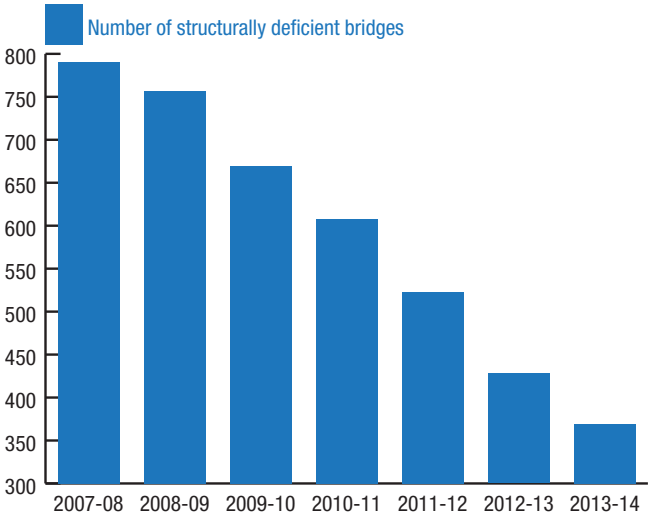
The Bridge Health Index *uses numbers from 0 to 100 to measure a bridge's condition by determining its remaining asset value. A bridge with a score of 100 has full remaining value, while a score of 0 indicates a bridge with no remaining value. Since 2008–09, Caltrans has maintained its goal of an overall Bridge Health Index of 94 or greater for state-owned bridges.*

A ***distressed bridge*** *is any bridge identified as needing major rehabilitation, replacement, seismic retrofit, or scour mitigation. Scour is erosion that can undermine a bridge's foundation. Since 2007–08, the number of distressed state-owned bridges has steadily declined from 750 to 557.*

Structurally Deficient Bridges

"Structurally deficient" does not mean a bridge is unsafe. It is a performance measure defined by the Federal Highway Administration to identify bridges that are eligible for federal funding for repairs or replacement. It could mean that the only thing a bridge needs is a new coat of paint.

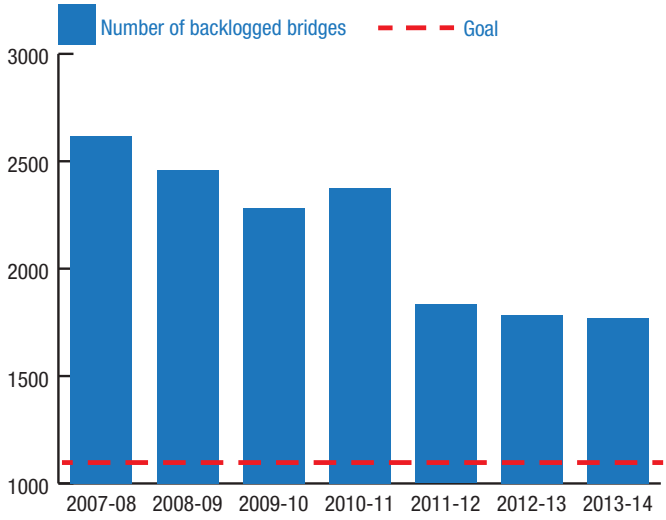
In California, approximately 95 percent of the bridges designated as "structurally deficient" have only minor cracks in the concrete deck or aging paint. Caltrans does not use this measure to make bridge management decisions, but monitors it for the Federal Highway Administration.



*"**Structurally deficient**" does not mean a bridge is unsafe. It is a performance measure the Federal Highway Administration uses to identify bridges eligible for federal funding. Of California's structurally deficient bridges, 95 percent have only minor cracks in the concrete deck or aging paint. Structurally deficient bridges dropped from 790 in 2007–08 to 369 in 2013–14.*

Backlogged Bridges

We also track backlogged recommended bridge repair work. This measure represents state-owned bridges with maintenance contract needs more than 2 years-old. We use this measure to evaluate bridge maintenance performance. The number of bridges with work recommendations more than 2 years-old has been reduced by nearly 900 in the past six years to 1,771. While we've made huge progress since 2007–08, we have not yet met our goal of 1,090 or fewer backlogged bridges. All major bridge performance indicators are showing gradual improvement, but the need is great. Caltrans estimates it will cost about $3.4 billion to keep bridges in good health over the next decade.



*A state-owned bridge is considered backlogged if it has recommended repair work that is more than 2 years old. Since 2007–08, the number of **backlogged bridges** has dropped significantly from more than 2,500 to 1,771, but we have not yet met our goal of 1,090 or fewer.*

Source: Division of Maintenance

Caltrans workers stand on the Meridian Bridge on Highway 20 between Colusa and Sutter counties during a safety inspection. The swinging, turntable bridge is pivoted open in this photo.